

## REMARKS

This reply is submitted pursuant to 35 U.S.C. §132 and 37 C.F.R. §1.111. The Office Action was carefully considered by applicant(s) and undersigned attorney. Reconsideration is respectfully requested.

### **1. Summary of the Office Action.**

The drawings were objected to.

The disclosure was objected to.

Claims 1 and 3-7 were pending.

Claims 1 and 3-5 and 7 stand rejected under 35 U.S.C §103(a) over Peleg (No. 4,837,990) in view of Durham (No. 3,162,920).

Claim 6 stands rejected under 35 U.S.C §103(a) over Peleg in view of Durham and further in view of Robinson (No. 4,651,466).

### **2. Discussion.**

#### **Drawing Objections**

Responsive to the drawing objection, enclosed are amended drawings identified by "Replacement Sheet". The numeral "16" is removed from Figure 1.

#### **Disclosure Objections**

British Patent Application No. 0210091.5 served as the priority application of Published PCT International Application WO 2003/092358 (copy enclosed for the examiner's reference) and British

Patent GB 2388127. The specification has been amended to include these publication references.

Withdrawal of the objection is believed to be in order.

**Claim 1.** This claim was rejected under 35 USC §103(a) as being unpatentable over Peleg in view of Durham. The examiner noted that Peleg does not disclose rope anchorage points that are moveable, but regards this feature to be disclosed in Durham. Applicant has amended Claim 1 to clarify that the rope anchorage points are associated with the brackets secured to the legs. This feature is not disclosed in any of the references and has the advantage that it permits tunnel height changes to be made without requiring significant adjustment of the ropes used to anchor the cover in position. Adjustment of the bracket positions to alter the tunnel height automatically changes the ropes anchorage point positions. Consequently, the height adjustment operation is much simplified and quicker to undertake than would otherwise be the case, and there is no need to release or remove the anchorage ropes, or to retie the ropes. In contrast, in Durham the rope anchorage points are not associated with the brackets or even with the legs, but rather are simply provided on the cover itself. Height adjustment would inevitably require the ropes to be adjusted, this being avoided in the present invention. As the now claimed structure and function of the invention is not literally shown, suggested or made obvious by the applied art, withdrawal of the rejection is believed to be in order and is respectfully requested.

**The Section 132 Declaration** The examiner held that the 11/13/07 132 Declaration is insufficient to overcome the prior rejection of claim 1. Applicant acknowledges that his Declaration included a statement about the specific function of his invention. That statement was made to identify for the record a claim element at issue. His declaration went on include specific detailed comparison of his

invention with each of the applied references. Applicant respectfully disagrees with the examiner's positions that any of applicant's statements amounted to a mere affirmation that the claimed subject matter functions as intended, that applicant's identification of a functional element of the claim at issue is not relevant, and that applicant's discussion provided no objective evidence on the issue of nonobviousness in this case. Applicant requests reconsideration of his Declaration.

**Remaining Claims.** The remaining dependent claims each adds at least one limitation to the elements of its base claim, and is therefore deemed to be allowable with such base and any intervening claim, at least for this reason.

### **3. Conclusion.**

The pending claims are believed to be patentable for the reasons stated above. The amendments are believed to be supported by the specification, claims and drawings as filed. It is believed that this case is in a condition for allowance. Reconsideration and favorable action are respectfully requested.

**Should the Examiner believe that telephone communication would advance the prosecution of this case to finality, he is invited to call at the number below.**

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time under 37 CFR 1.136(a), provided a Petition is not submitted separately.

Please charge any fee due not paid by a check or credit card provided herewith, and/or charge any underpayment in any fee, and/or credit any overpayment in fee, to Deposit Account No. 19-2381.

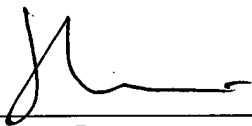
ANY FEES DUE ARE CALCULATED AS FOLLOWS:

	<u>NUMBER</u>	<u>FEE</u>
TOTAL Claims Remaining over that Previously Paid:	None	\$ 0
INDEPENDENT Claims Remaining over that Previously Paid:	None	\$ 0
	SUM Claim Fees:	\$ 0
EXTENSION Fees:		\$ 0
OTHER Fees:		\$ 0
	<u>TOTAL AMOUNT (if any)</u>	\$ 0

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Respectfully submitted,



Joel D. Skinner, Jr.  
Reg. No. 33,786

Date: 7-11-08

Skinner and Associates  
212 Commercial Street  
Hudson, Wisconsin 54016  
Tel.: (715) 386-5800  
FAX: (715) 386-6177  
Internet e-mail: [info@skinnerlaw.com](mailto:info@skinnerlaw.com)

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(71) Applicant (for all designated States except US): **HAY-GROVE LIMITED** [GB/GB]; Redbank, Ledbury, Herefordshire HR8 2JL (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **CORBETT, Thomas, Robert** [GB/GB]; St Johns House, westhope, Herefordshire HR4 8BU (GB).

(74) Agent: **BAILEY, Richard, Alan**; Marks & Clerk, 27 Imperial Square, Cheltenham GL50 1RQ (GB).

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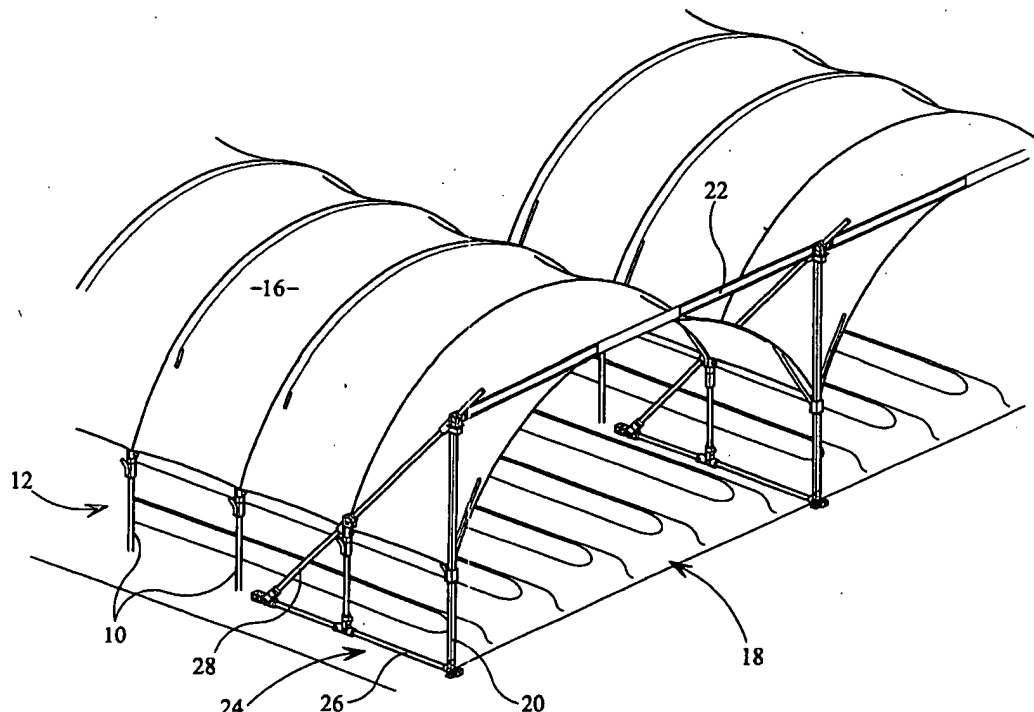
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **SUPPORT SYSTEM**



(57) Abstract: A support system includes an end frame comprising a pair of uprights (20), and a cross member (22), each upright (20) being secured at its lower end to a base member (26), a diagonal strut (28) interconnecting the base member (26) and the upright (20).

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## **Support System**

This invention relates to a support system suitable for use in the cultivation of crops. In particular the invention relates to a support system for a poly tunnel providing increased strength and permitting the automated operation of handling and  
5 other equipment for use in or with the tunnel. However, it will be appreciated that the support system may be used in other applications, for example in supporting the crops.

Poly tunnels are in widespread use in the United Kingdom in the cultivation of, for example, soft fruits. A poly tunnel typically comprises, in its simplest form,  
10 a plurality of generally inverted U-shaped hoops over which a covering is located. The hoops are typically located on 'legs' that are anchored in place by screwing them into the soil. However, alternative techniques may be used, for example if the poly tunnel is to be erected upon a hard standing.

The benefits of poly tunnels are that they protect crops from rain and other  
15 adverse weather conditions, extend the growing season, provide a controllable growing environment and reduce wastage.

In spite of these advantages, however, the limited strength of the basic design of existing tunnels prevents their use in windy conditions reducing the length of the season over which they can be used. The nature of the crops cultivated in poly

tunnels tends to be very high value and very labour intensive and therefore by improving the environmental control inside the poly tunnel and using the strength of the poly tunnel to partially mechanise operation currently done manually the user will be able to reduce production costs.

- 5        Although not restricted to use with a poly tunnel of such simple form, one aspect of the invention relates to a support system incorporating an end frame for use with a poly tunnel. According to the present invention there is provided a support system including an end frame comprising a pair of uprights and a cross member, each upright being secured at its lower end to a base member which
- 10 extends, in use, in a direction generally parallel to the longitudinal axis of the poly tunnel, and a diagonal strut interconnecting the base member and associated upright. Such an arrangement is advantageous in that it provides good strength to the end of the support frame. A poly tunnel incorporating the system thus has an improved ability to withstand adverse weather conditions. Similar advantages may arise where
- 15 the support system is used in other applications.

The invention also relates to a system that includes a plurality of end frames located side-by-side with a drive shaft extending along the cross member of each of the end frames, the drive shafts being connected to one another such that a single power source can be used to drive all of the drive shafts. The drive shafts may be

used to drive equipment to assist in environmental control and facilitate the partial mechanisation of operations associated with crops being grown. The frame further conveniently includes a plurality of power take-off points whereby machinery associated with the poly tunnel can be driven from the drive shaft. The machinery  
5 may include, for example, harvesting rigs, devices for operating vents, moving screens, or lifting doors, or a number of other operations.

The invention further relates to an arrangement in which a plurality of support systems are located side-by-side, a drive shaft being associated with each support system, the drive shafts being interconnected such that a single motor can  
10 be used to drive all of the drive shafts.

As mentioned hereinbefore, the support systems may be used in the support of poly tunnels, but may alternatively be used in other applications, for example in the support of agricultural crops.

The invention will further be described, by way of example, with reference  
15 to the accompanying drawings, in which:

Figure 1 is a diagrammatic perspective view of part of a poly tunnel arrangement incorporating a support system in accordance with an embodiment of the invention;

Figure 2 is a view of part of one of the end frames of the poly tunnel of



Figure 1;

Figures 3 to 8 are enlarged views showing various parts of the end frame;

Figure 9 is a diagrammatic view showing the position of some power take-off points; and

5        Figures 10 to 14 are views showing an alternative embodiment.

The poly tunnels illustrated in Figure 1 each comprise a support system including a plurality of upright legs 10 arranged in rows 12. Interconnecting hoops 14 are located between pairs of legs 10. A sheet 16 is stretched over the support system to form a tunnel. Figure 1 illustrates parts of two adjacent tunnels. In order  
10 to improve the rigidity of the tunnel structures, in accordance with the invention, at each open end of each tunnel, the support system includes a tunnel end frame 18.

Each end frame 18 comprises a pair of triangular frames 24 (shown in more detail in Figure 2) which are secured to a cross member 22. The uprights 20 of the triangular frame 24 are supported by a base member 26 and a diagonal strut 28  
15 which interconnects the base member 26 and the upright 20.

The support system further replaces the last two legs 10 at the end of each tunnel with two integrated legs. The first of these legs is fixed to the upright 20 and supports the end of one of the hoops 14. The second of these legs is secured, at its lower end, to the base member 26, and at its upper end to the diagonal strut 28. It

will be appreciated, therefore, that these two legs are held particularly rigidly in an upright condition. It will be appreciated, therefore, that the end two of the hoops 14 are both supported in a relatively rigid manner as compared to the remainder of the hoops 14 as the supports for the end two of the hoops form part of the triangular support frame for the end frame 18.

In order to allow for variances in dimensions, uneven or sloping ground surfaces or situations where the ends of the poly tunnels are not perpendicular to the crop rows, each joint of the end frame uses connectors in such a manner as to allow some adjustment of all the members relative to the upright in two perpendicular directions, during construction. The nature of the connections between the various components of the side frames 24 are shown in greater detail in Figures 3 to 8.

Figure 3 illustrates the connection between the upper part of one of the uprights 20 and the diagonal strut 28. As illustrated, this connection includes a sleeve 40 which extends around a part of the strut 28 and is securable to the strut 28 to prevent movement of the sleeve along the strut 28. A housing member 42 is pivotally secured to the sleeve 40, the housing member 42 being secured to the upper part of the upright 20 and carrying brackets for use in securing the cross member 22, the drive shaft 30 (see below) and the auxiliary drive shaft 36 (see below) in position. The design of the housing member 42 is such as to permit the

desired movement during assembly.

Figure 4 illustrates the connection between the lower part of the upright 20 and the base member 26. This connection simply takes the form of a bracket 44 mounted upon the lower part of the upright 20 and secured to a pin 46 secured to the  
5 base member 26. Also secured to the base member 26 is a housing 48 whereby a soil anchor may be used to secure the base member 26 in position, in use.

Figure 5 illustrates a connection between the lower part of the support 10 and the base member 26. This connection takes the form of a bracket 50 secured to the lower end of the support member 20, the bracket 50 being secured to a sleeve 52  
10 which in turn is secured to the base member 26.

Figure 6 illustrates the connection between the upper part of the support member 10 and the strut 28. This connection is very similar to that illustrated in Figure 5. Like reference numerals are used to denote like parts.

Figure 7 illustrates the connection between the base member 26 and the strut  
15 28. Again, this arrangement is similar to that shown in Figure 5. Again, a housing 48 is provided whereby a soil anchor may be used to secure the base member 26 in position, in use.

Figure 8 illustrates the joint between the support member 20 and the cross member 22. As illustrated, this joint allows the cross member 22 to articulate in two

generally perpendicular axes while keeping the front face of the cross member 20 in the generally same vertical plane as the front face of the support member 20.

In addition to serving to provide additional rigidity to the end of the poly tunnel, the end frame 18 further serves to support a drive shaft 30 which extends  
5 along and is supported by the cross member 22. As illustrated diagrammatically in Figure 9, the drive shaft 30 is driven by a motor 32 for rotation about its axis. Where, as illustrated, two or more poly tunnels are located adjacent one another, then the drive shaft 30 of one of the tunnels may be connected to the drive shaft of an adjacent one of the tunnels, thus all of the drive shafts for the series of tunnels  
10 may be driven by a single power source. A number of power take off points are provided whereby machinery associated with the poly tunnels may be arranged to be driven by the drive shaft 30. Some suitable locations for the power take off points are illustrated in Figure 9. These positions include a position denoted by reference numeral 34 in Figure 9 at the mid-point of the cross member 22.

15 By way of example only, this power take off point may be used to drive machinery, for example a pulley system to serve as a conveyor whereby for example harvested fruit or other crops may be transported along the length of the poly tunnel, thereby assisting in the harvesting operation as the person or machinery used in harvesting the crop need not make repeated trips along the length of the poly tunnel

in order to remove harvested product from the tunnel, but rather the harvested product may be placed upon the conveyor and automatically be transported to the end of the poly tunnel. In addition, the drive shaft 30 may be arranged to drive auxiliary drive shafts 36 which extend along the uprights 20. Power take off points  
5 38 may be provided whereby other devices may be powered. By way of example only, these may comprise devices for use in the automatic opening and closing of vents or screens or for use in the opening or closing of doors.

Although driven by a common motor, separate clutches and gearing mechanisms may be provided to allow several devices to be controlled  
10 independently.

Figure 10 is a diagrammatic view of an alternative end frame design comprising a pair of triangular frames 50 interconnected by a cross member 52. Each triangular frame 50 includes an upright 54, a base member 56 and a diagonal strut 58. Figure 11 illustrates a connector 60 which may be used to connect the  
15 upright 54, diagonal strut 58 and cross member 52 to one another, the connector 60 including a sleeve 62 which can be clamped around the upright 54 and having brackets 64, 66 secured thereto which are securable to the cross member 52 and diagonal strut 58.

An end one of the hoops of the poly tunnel is replaced by a pair of telescopic

bracing struts 68 connected between brackets 70 secured to the cross member 52 (see Figure 12) and brackets 72 secured to the uprights 54 (see Figure 13). A further bracing strut 74 may also be provided between the cross member 52 and the next hoop of the poly tunnel (see Figure 14).

5        It will be appreciated that a number of changes may be made to the specific arrangements described hereinbefore and the application is not limited to the specific arrangements disclosed. By way of example only, it will be appreciated that a number of dimensional changes could be made and the nature of the various connections could be changed. Further, the position of the motor may be changed.

10        Although the description hereinbefore is of a poly tunnel, it will be appreciated that the support system of the invention may be used in other applications. For example, the support system may be used in supporting agricultural crops. One suitable application would be in the support of a table grape system.

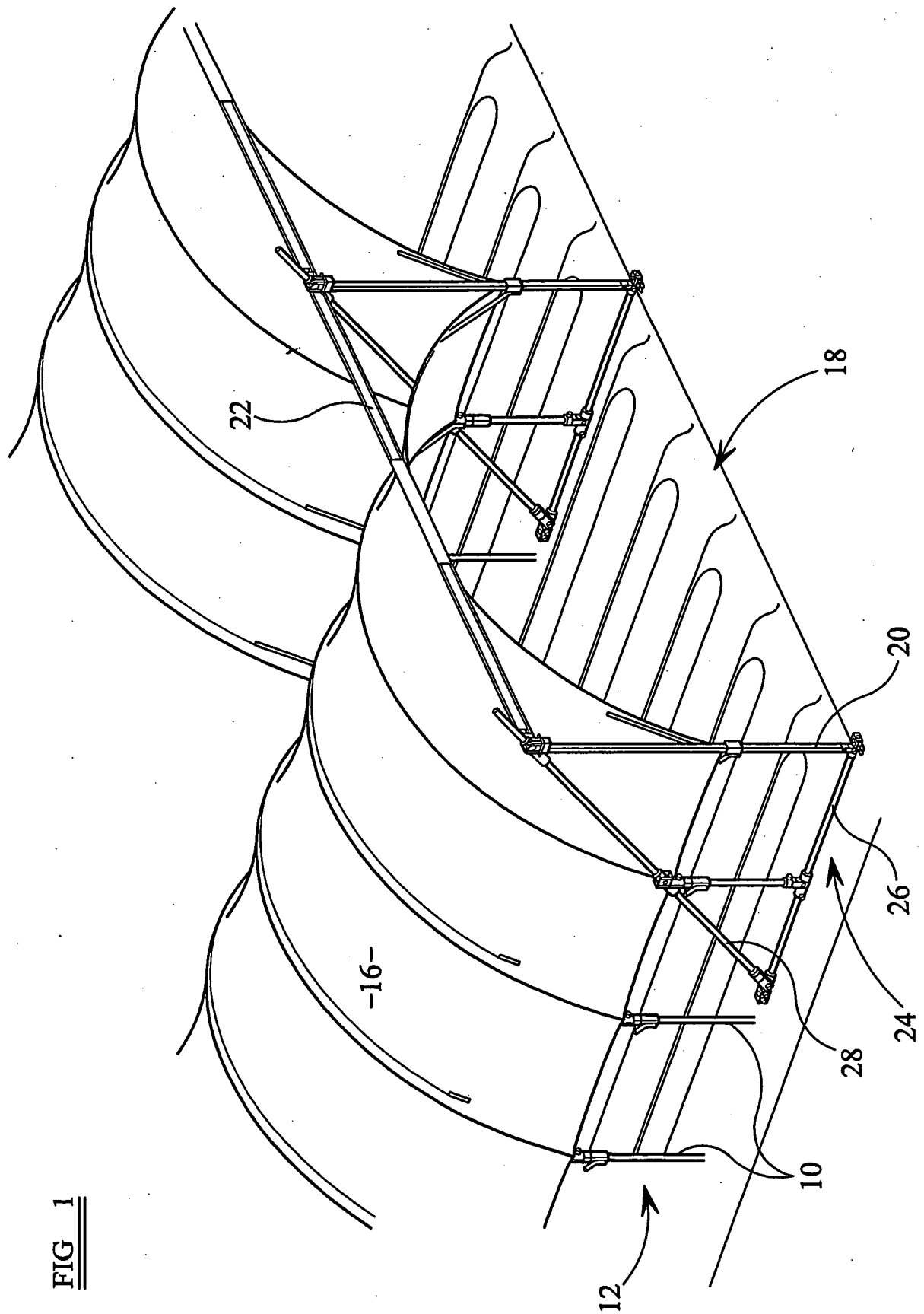
**CLAIMS**

1. A support system including an end frame comprising a pair of uprights and a cross member, each upright being secured at its lower end to a base member which extends, in use, in a direction generally transverse to the axis of the cross member,  
5 and a diagonal strut interconnecting the base member and associated upright.
2. A system according to Claim 1, further comprising a hoop support leg connected between the base member and the diagonal strut.
3. A system according to Claim 1 or Claim 2, further comprising a hoop support leg secured to the upright.
- 10 4. A system according to Claim 1 or Claim 2, further comprising a bracing strut secured between the upright and the cross member.
5. A system according to any one of the preceding claims, further comprising an adjustable bracket connecting the diagonal strut, upright and cross member to one another.
- 15 6. A system according to any one of the preceding claims, further comprising a drive shaft extending adjacent at least part of the cross member.
7. A system according to Claim 6, further comprising a second end frame, the drive shaft being connected to a drive shaft associated with the second end frame.
8. A poly tunnel comprising a support system as claimed in any one of the

preceding claims and a cover supported by the support system.

9. A support system arrangement comprising a plurality of support systems which are located side-by-side one another, a drive shaft being associated with each support system, the drive shafts being interconnected such that a single motor can
- 5 be used to drive all of the drive shafts.
10. An arrangement according to Claim 9, wherein at least one of the support systems is in accordance with any one of Claims 1 to 7.





**FIG. 1**

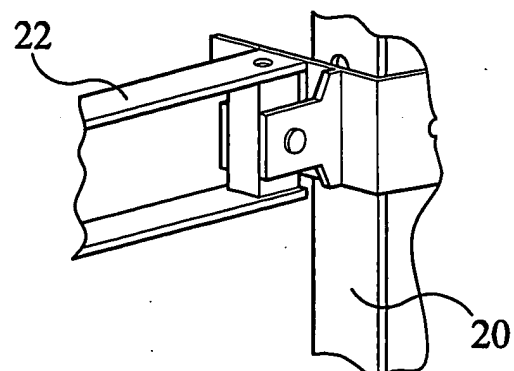
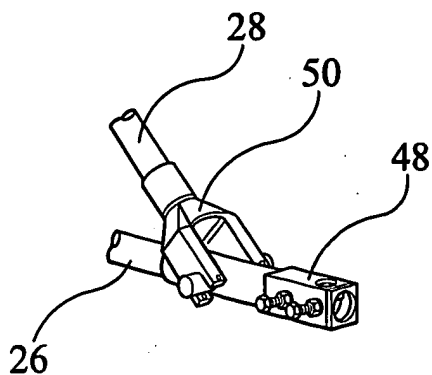
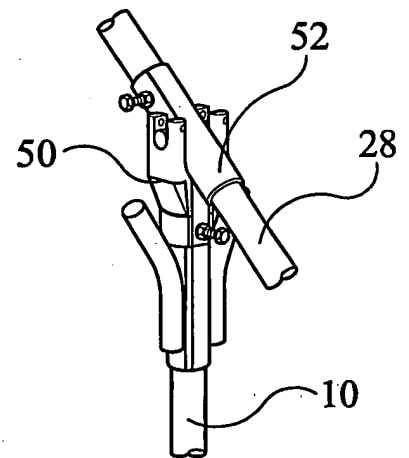
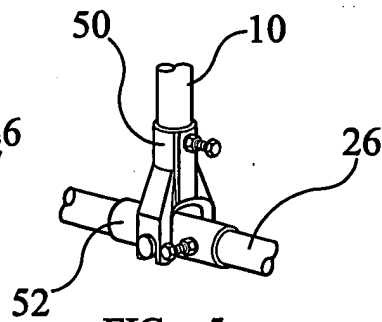
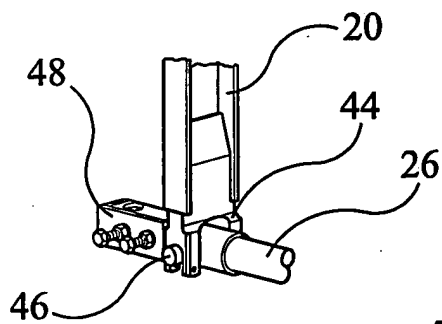
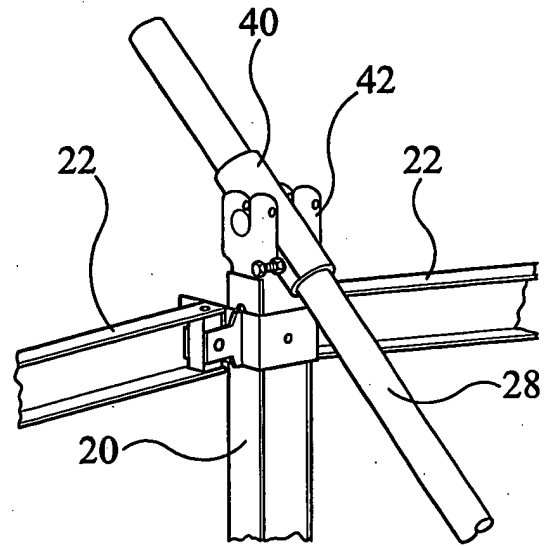
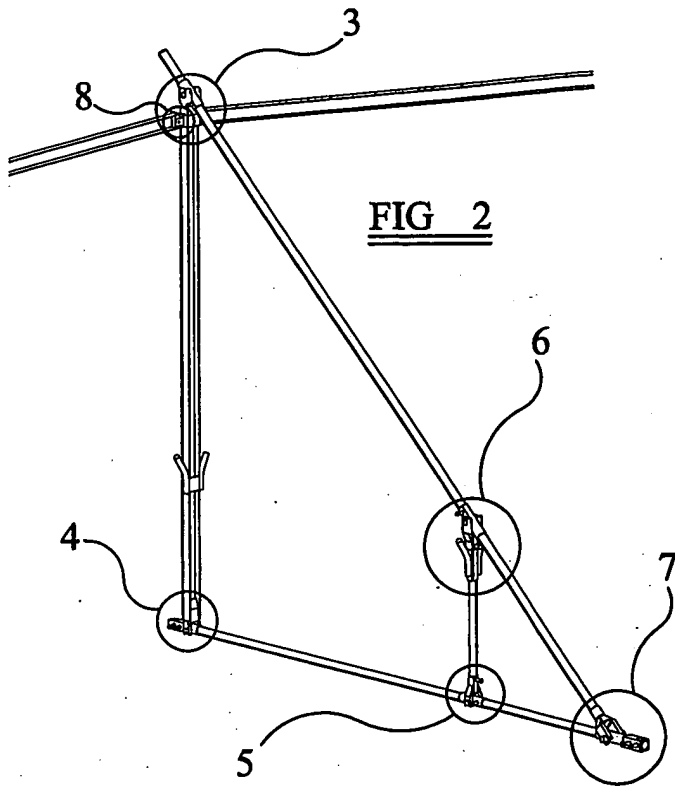
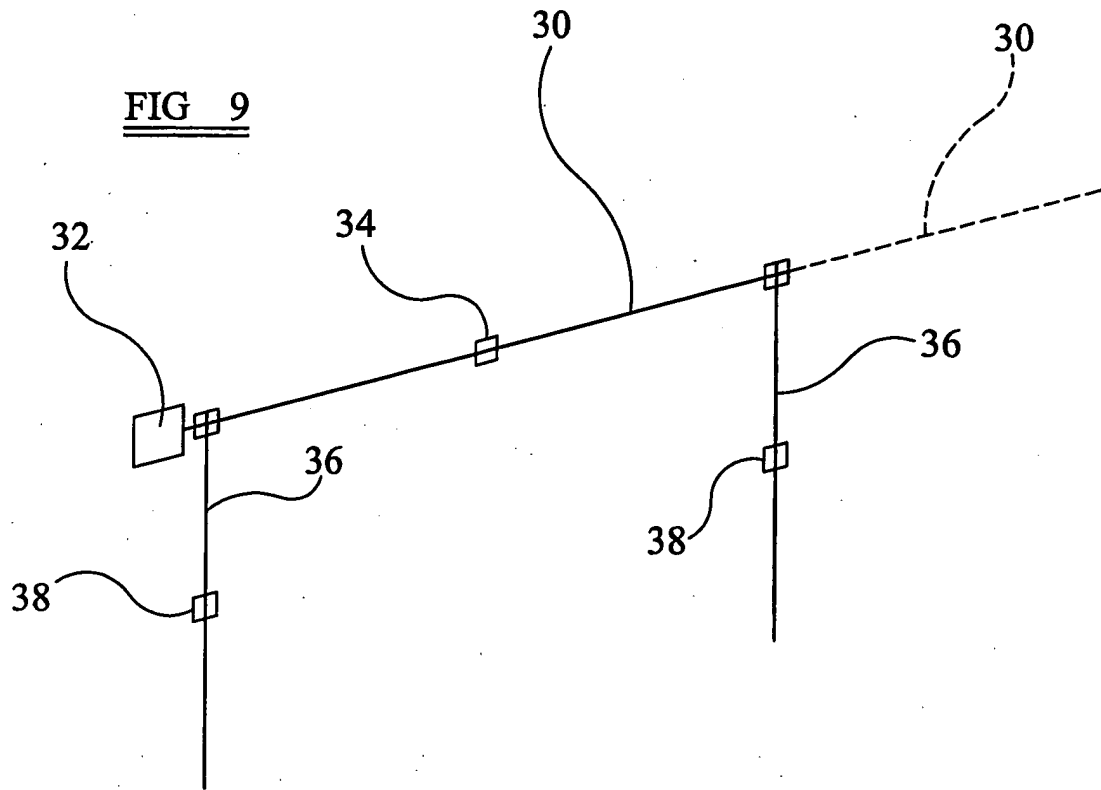


FIG 9FIG 10